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I, JONNE YABSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PR 4650 for a patent by AUSTRAL LOCK IND filed on 27 April 2001.

I further certify that pursuant to the provisions of Section 38(1) of the Patents Act 1990 a complete specification was filed on 15 June 2001 and it is an associated application to Provisional Application No. PR 4650 and has been allocated No. 51955/01.

WITNESS my hand this  
Fifteenth day of August 2001

*J R Yabsley*

JONNE YABSLEY  
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SUPPORT AND SALES



## **PROVISIONAL PATENT**

### **Titl : Improv m nts in Padlocks**

The invention comprises improvements in padlocks and a means of manufacturing padlocks, and improvements in padlock shackles and a means of manufacturing padlock shackles.

Embodiments described reference two types of padlocks; a Type 1 padlock which may be opened while having the key removed, and a Type 2 padlock where the key cannot be removed unless the shackle is closed, i.e. both shackle legs are within the body of the padlock.

In an embodiment the Type 1 padlock may be converted to a Type 2 padlock by minor adjustment to the cylinder and without additional components.

Each of the padlock embodiments may employ a shackle of the well known designed described below but preferably they employs the improved shackle described towards the end of in this application. It is envisaged that this improved shackle be employed in all types of padlocks and not just those described herein.

As is common, padlocks described herein are operated by turning a key to rotate a barrel in a cylinder to rotate a cam that controls two balls within the padlock body.

Embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

Fig 1 is a schematic side view of an unlocked padlock with an open shackle,

Fig 2 is the cylinder of the padlock of Fig 1 configured for a Type 1 padlock and shown removed for ease of description,

Fig 3 is the cylinder of the padlock of Fig 1 configured for a Type 2 padlock and shown removed for ease of description

Fig 4 is an exploded isometric view of the padlock of Fig 1

Fig 5 is an underside view of the padlock of Fig 4

Fig 6 is a partialschematic side view of a locked padlock where the shackle is closed,

Fig 7 is a schematic partial sectional view AA of the padlock of Fig 6,

Fig 8 is a schematic partial sectional view BB of the padlock of Fig 6,

Fig 9 is a partial schematic side view of an unlocked padlock where the shackle is open,

Fig 10 is a schematic partial sectional view AA of the padlock of Fig 9,

Fig 11 is a schematic partial sectional view BB of the padlock of Fig 9,

Typically each padlock employs a shackle 1 of well known design comprising a pair of substantially parallel cylindrical legs, one short 2 and one longer 3, connected by an arcular portion 4 of substantially circular cross-section. Towards the end of the short leg and facing the longer leg is a first locking recess 5 and directly opposite in the longer leg and facing the short leg is a second locking recess 6. Towards the end of the longer leg is a peripheral recess 7 which is connected to the second locking recess by a longitudinally disposed flat or channel 8. Preferably the peripheral recess and channel or flat are the same depth below the surface of the shackle and a lesser depth than the second locking recess. Usually the first and second locking recesses and the longitudinal flat are formed by broaching and therefore comprise bitted recesses. The recesses of the improved shackle described below preferably comprise spherical recesses.

The padlock includes a body 11, as is common, having a deep bored opening 12 at the top end to receive the longer leg 3 and a short bored opening 13 to receive the short leg 2, and a transverse bored cross recess 14 towards the top end of the body commencing at a side surface 15, later plugged, and orthogonally intersecting the deep and short bore and in the region of the short bore having a constriction 16 of reduced cross-section so the ball cannot pass from 14 into 13. Preferably the axis of the cross recess intersects the axis of the short and deep bored holes. Preferably all bored holes are circular in cross-section.

The lock is configured such in a locked configuration, the short leg including the first locking recess is within the short recess and the longer leg including the second locking recess is within the long recess while additionally the locking recesses 5 and 6 are substantially co-axial with the axis of the cross-recess 14.

In the locked configuration a first ball 17 locates partly within the first locking recess 5 and partly in the transverse recess 14 and preferably a second ball 18 lies partly in the second locking recess 6 and partly within the cross recess 14. Between the balls is a displaceable cam 19 of varying horizontal cross-section but in the locked

configuration, the balls abutt a cylindrical side surface 20 of the cam, this engagement preventing the balls from moving inwardly to release the shackle legs.

When the cam is in the unlocked configuration, the first ball 17 is within the cam first recess 21 and completely withdrawn from the first locking recess in the short shackle to thereby release the short leg.

Opposite this first cam recess 21 is a second, less deep similar cam recess 22 and when the short leg has been released, the second ball is held within the second leg. The second leg has a longitudinally elongated recess 8 as described above and to a depth that the second ball can be retained in this recess while the shackle is moved longitudinally in relation to the casing.

The peripheral recess 7 which is preferably, (and in an embodiment) is substantially the same depth as the longitudinally elongated recess so that when the padlock is configured with the second ball in the second cam recess while being partly within the peripheral recess, the shackle can be rotated in relation to the body while being retained in the body. The above is well known.

Coaxial with the axis of rotation of the cam and commencing at a bottom surface is a cylindrical bottom recess 23 which extends towards the cross-recess to intersect the cross recess to provide a recess for the cam 19. Preferably the padlock accepts a removeable cylinder 23 which includes a key operable barrel 24, in which case, the padlock body preferably includes an offset cylindrical bottom recess 25 of lesser depth having an axis parallel the bottom recess 23 and displaced sideways so that this recess is intercepted by the axis of the short bored recess. The portion of the bottom recess beneath the cam and the offset recess together form a chamber of a generally figure 8 cross-section to accommodate a cylinder of similar cross-section.

The offset bore extends to 26, almost the bottom of the short bore, the bottom of which has a hole 27 which extends to the offset recess so that a screw 28 may be passed from the short recess to engage in a tapped recess 29 in an offset cylinder portion 30 to retain the cylinder in the chamber – the cylinder being removeable when the short arm is not in the short bored recess.

The barrel has towards the cam posts 31 and 32 extending towards the cam to longitudinally overlap arcular shoulder 33 comprising part of a post 36 of the cam

which define recesses 34 in the end of the cam into which the posts project. This arrangement operably couples with free movement the cam to the barrel so that the barrel may be turned to displace the cam.

The cam includes a spring which wraps around the body of the cam, having one end engaged in one of the recesses 34 and the other projecting into the recess 25 and configured to bias the cam away from the unlocked configuration of Fig 9 and towards the locked configuration of Fig 6. Because the cam is biased a stop member is included in the cam to prevent the cam from rotating clockwise with reference to Fig 7 past the correct locking position shown in Fig 7.

The stop member 35 straddles the post 36 and has two inwardly projecting shoulders 38 which are engageable by the shoulders 33 to operably couple with free movement the stop member to the post. In the locked configuration the spring biases the cam clockwise, the stop shoulder 40 abuts a wall of the recess 25 preventing it from being rotated clockwise and the shoulders 33 engage the shoulders 38 to urge the stop member clockwise thereby restraining the cam from rotating.

Rotation of the barrel, with reference to Fig 11, in an anticlockwise direction causes the pins 31 and 32 to engage the shoulder 38 to urge the stop member to rotate in an anticlockwise direction but in so doing the shoulders 38 engage the shoulders 33, as shown in Fig 11 to cause the cam to rotate. The whole cam assembly rotates until the shoulder 40 engages the wall of recess 25, at which point the balls 17 and 18 align with the recesses in the 21 and 22 in the cam.

In this way a Type 1 padlock is provided.

Additionally, the cam has cylindrical extensions 41 to the recesses 34 and the cylinder pins 31 and 32 may be extended so that they project into these recesses 41 to directly couple the cam to the barrel without free movement. In this way a Type 2 padlock is provided.

When the cylinder is removed from the padlock of Fig 11, the cam may be rotated clockwise an additional amount till a deep recess 42 in the cam aligns with ball 18. This recess being sufficiently deep to allow the ball 18 to withdraw completely from the shackle thereby enabling the shackle to be removed from the body.

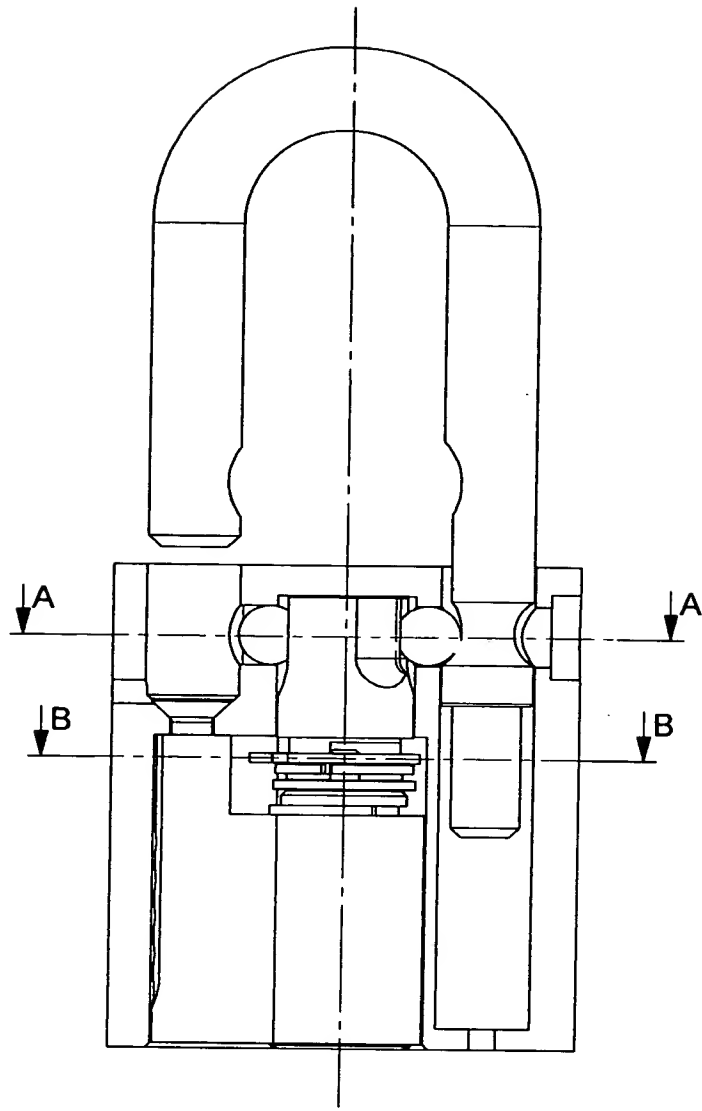


Fig 9

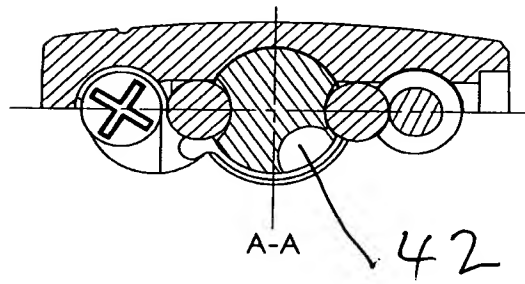


Fig 10

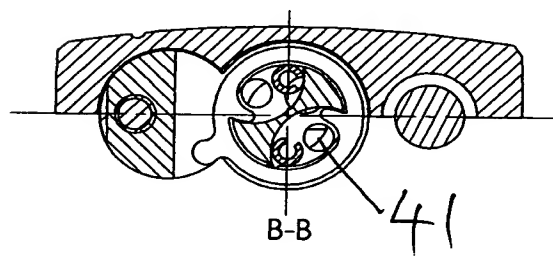


Fig 11

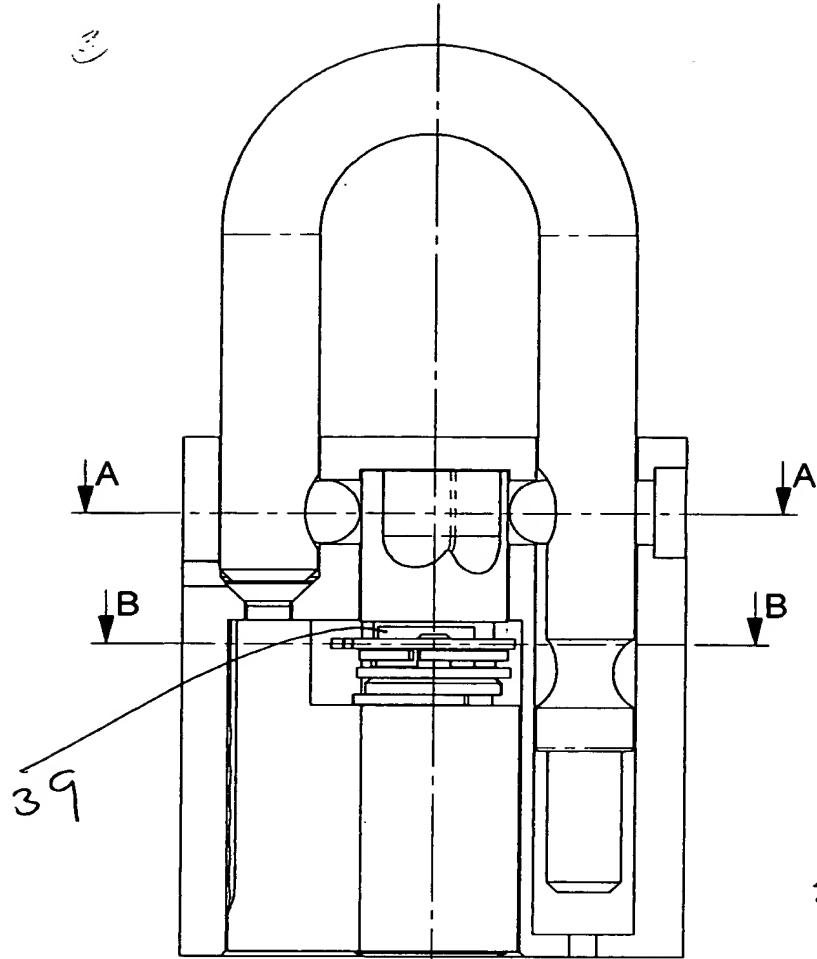


Fig 6

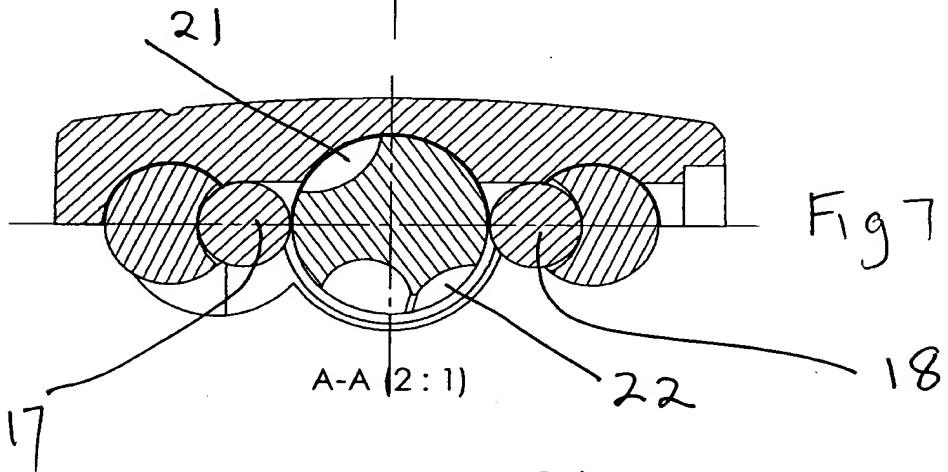


Fig 7

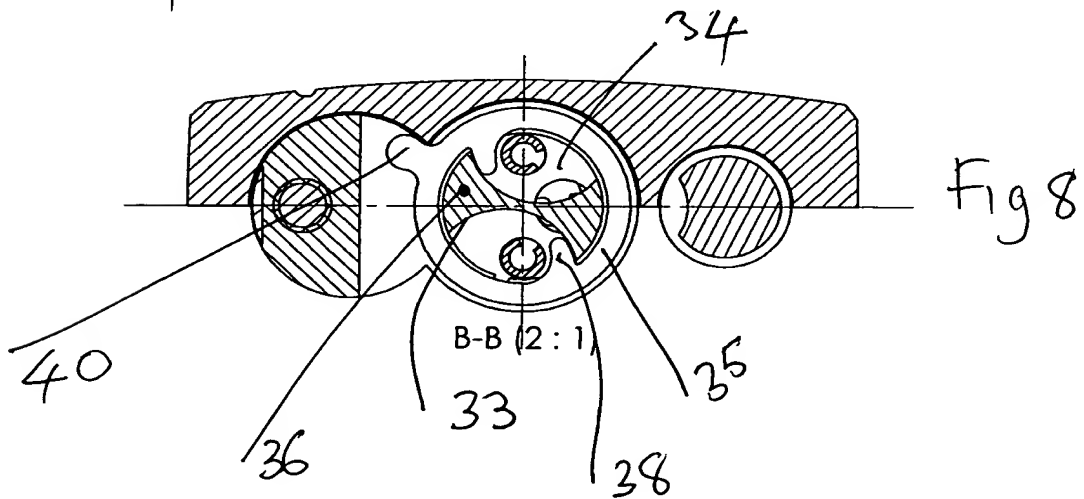
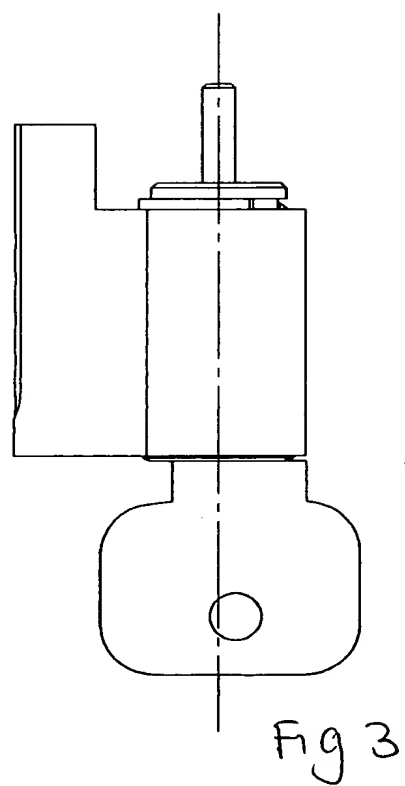
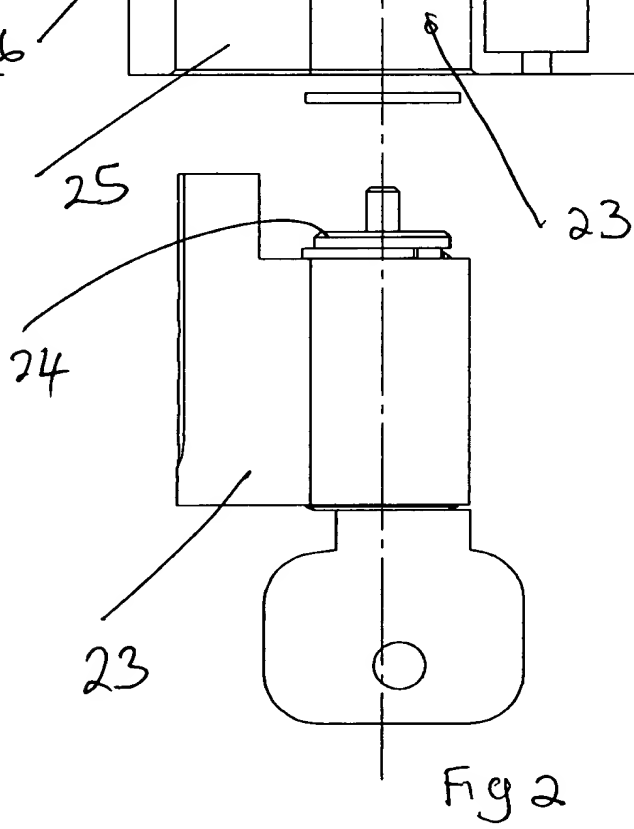
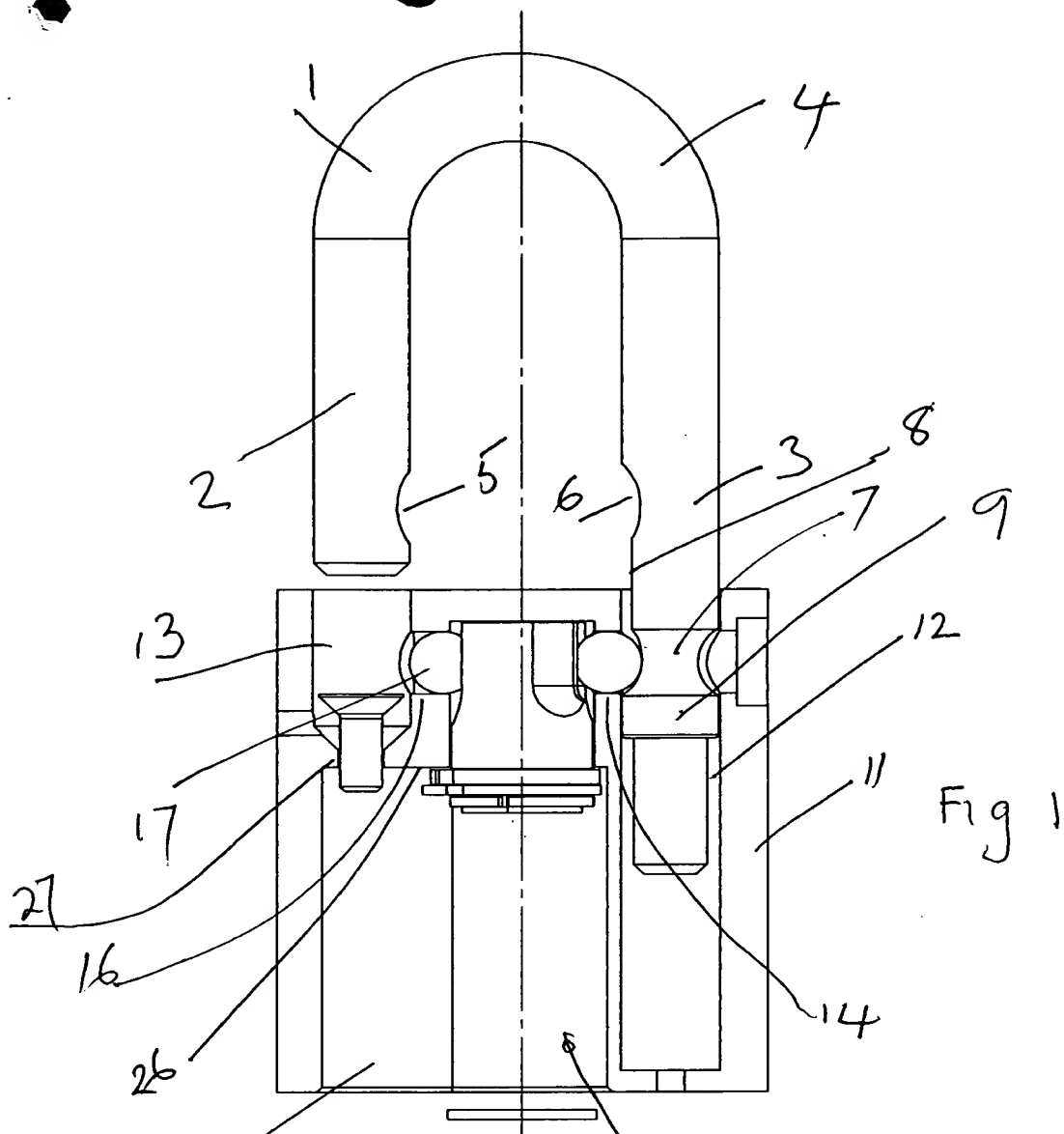


Fig 8





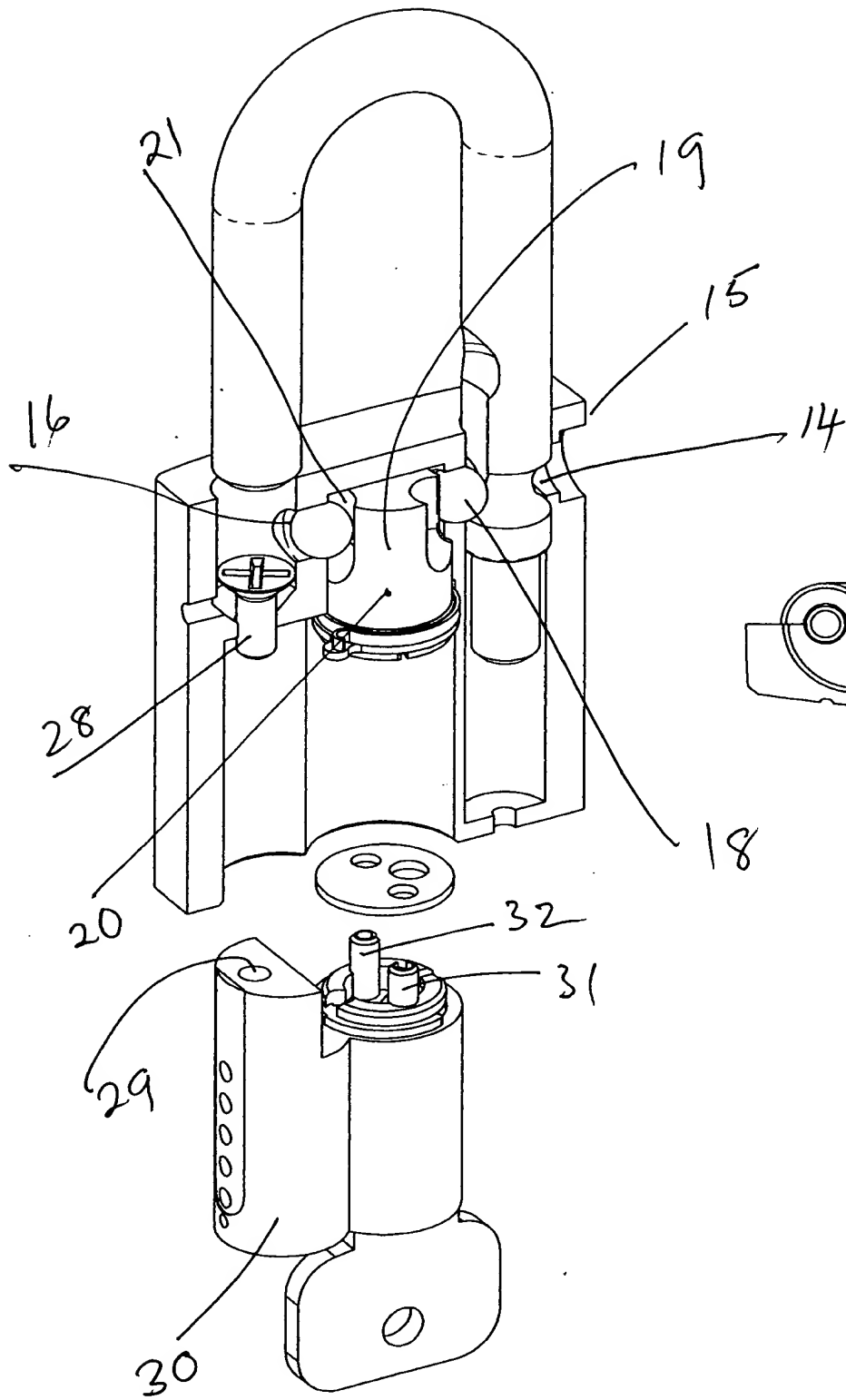


Fig 4

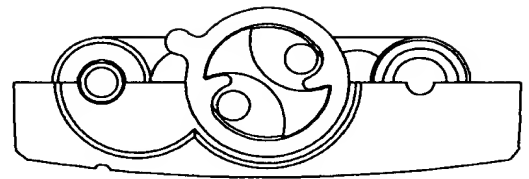


Fig 5